

UNIVERSITY OF SOUTH AUSTRALIA

DIVISION OF INFORMATION TECHNOLOGY, ENGINEERING AND THE
ENVIRONMENT

School of Geoinformatics, Planning and Building
Semester 1, 2000

Geodetic Science 4N : 10218

Time Allowed : 3 hours + 10 minutes reading time

NOTE PROGRAMMABLE CALCULATORS ARE ALLOWED

General Instructions to Candidates:

Total Marks = 100

Attempt only FOUR questions. Attempt three (3) questions from Section A and one (1) question from Section B.

Use separate books for each section.

All questions are of equal value.

Please ensure front of answer book is completed with your name, student I.D. number and course.

SECTION A

QUESTION 1

Detail the various heightening systems that may be used in geodesy and discuss:

- a. How they are inter-related;
- b. How the datums for these systems may be defined; and
- c. their practical application.

QUESTION 2

Detail methods of reducing observed gravity values on the earth's surface to the geoid and discuss the use of the gravity anomalies resulting from these reductions.

QUESTION 3

Stokes' Formula may be used to determine the geoid ellipsoid separation and may be given in the general form:

$$N = \frac{R}{4\pi G} \iint_{\sigma} g S(\sigma) d\sigma$$

- a. Outline the derivation of this formula.
- b. What assumptions are made in the derivation of this formula?
- c. Show a general shape of the function $S(\sigma)$
- d. If the value of R was changed by an amount of 100 metres what would be the resulting effect on the derived value of N .

QUESTION 4

- a. With the aid of a diagram derive the inter-relationship between the geoid ellipsoid separation and the disturbing potential (Brun's Formula) stating any assumptions made.
- b. Define the following and discuss their inter-relationships.
 - i) gravitational force
 - ii) gravity
 - iii) normal potential
 - iv) normal gravity
 - v) geopotential
 - vi) geoid

END SECTION A

SECTION B

QUESTION 1

Stop and Go Kinematic GPS is commonly used in South Australia for its tertiary control network.

Describe :

- a) its concepts;
- b) its methods of initialisation; and
- c) the field collection of kinematic data.

QUESTION 2

- a) Define with the aid of diagrams where applicable:
 - the World Geodetic System 1984
 - the Australian Geodetic Datum 1984
- b) GPS positioning gives coordinates in a WGS84 geocentric coordinate system. Describe, with the aid of diagrams, its transformation into AGD84.